

REMARKS

At the time of the Office Action dated February 20, 2003, claims 1-19 were pending in this application. Of those claims, claims 1-10 have been rejected and claims 11-19 have been withdrawn from consideration pursuant to the provisions of 37 C.F.R. § 1.142(b). Claims 4-9 have been amended, and claims 1-3 have been cancelled. Care has been exercised to avoid the introduction of new matter.

Claims 4 and 5 have been amended to be placed in independent form, and claims 4 and 5 include all of the limitations recited in claims 1 and 2, upon which claims 4 and 5 depend. Claim 9 has been amended to be placed in independent form. Claims 7-9 have been amended to address dependency issues arising from the cancellation of claim 1. Applicant submits that the present Amendment does not generate any new matter issue.

In the second enumerated paragraph of the Office Action, the Examiner asserted that the title of the invention was not descriptive. In response, the Title has been changed to "METHOD FOR MANUFACTURING SEMICONDUCTOR DEVICE USING PREDETERMINED MEASUREMENT VALUE."

Claim 9 is rejected under the second paragraph of 35 U.S.C. § 112

In the third enumerated paragraph of the Office Action, the Examiner asserted a lack of antecedent basis for the recitation "the elapsed time " in claim 9. This rejection is respectfully traversed.

The Examiner referred to the recitation of "a time which has elapsed" in claim 9.

* (Therefore, antecedent has been provided for the term "the elapsed time." Thus, the imposed rejection of claim 9 under the second paragraph of 35 U.S.C. § 112 is not applicable to that term.

CLAIMS 1-3 AND 6 ARE REJECTED UNDER 35 U.S.C. § 102 AS BEING ANTICIPATED BY

YOKOYAMA ET AL., U.S. PATENT NO. 5,858,863 (HEREINAFTER YOKOYAMA)

In the fifth enumerated paragraph of the Office Action, the Examiner asserted that Yokoyama discloses a method of manufacturing a semiconductor device corresponding to that claimed. This rejection is respectfully traversed.

(Claim 6 has been amended to recite that the processing requirements for wet etching of a predetermined film are determined after the predetermined film has been dry etched. As Yokoyama fails to teach or suggest that the dimension of the film to be processed is measured after dry etching of the film and the processing requirements for wet etching are then determined in accordance with the measured dimension of the film, claim 6 is not identically disclosed by Yokoyama within the meaning of 35 U.S.C. § 102. Applicant, therefore, respectfully solicits withdraw of the rejection of claim 6 under 35 U.S.C. § 102 based upon Yokoyama.

CLAIMS 1-3 AND 6 ARE REJECTED UNDER 35 U.S.C. § 102 AS BEING ANTICIPATED BY

CAMPBELL ET AL., U.S. PATENT NO. 6,284,622 (HEREINAFTER CAMPBELL)

In the sixth enumerated paragraph of the Office Action, the Examiner asserted that Campbell discloses a method of manufacturing a semiconductor device corresponding to that claimed. This rejection is respectfully traversed.

Claim 6 has been amended to recite that the processing requirements for wet etching of a predetermined film are determined after the predetermined film has been dry etched. As Campbell fails to teach or suggest that the dimension of the film to be processed is measured after dry etching of the film and the processing requirements for wet etching are then determined in accordance with the measured dimension of the film, claim 6 is not identically disclosed by Campbell within the meaning of 35 U.S.C. § 102. Applicant, therefore, respectfully solicits withdraw of the rejection of claim 6 under 35 U.S.C. § 102 based upon Campbell.

CLAIM 4 IS REJECTED UNDER 35 U.S.C. § 103 FOR OBVIOUSNESS BASED UPON SYNDER, U.S. PATENT NO. 5,863,828, IN VIEW OF OGAWA ET AL., U.S. PATENT NO. 5,384,276 (HEREINAFTER OGAWA) OR SEO ET AL., U.S. PATENT NO. 6,376,303 (HEREINAFTER SEO)

In the seventh enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the methodology of Synder in view of Ogawa or Seo to arrive at the claimed invention. This rejection is respectfully traversed.

In the statement of the rejection, the Examiner asserted that:

(Synder does not teach the measurement value may be the concentration of impurities contained in the silicon oxide film.

The Examiner then relied upon Ogawa or Seo to teach that different concentrations of impurities result in different etching rates and that it would have been obvious to measure the concentration of impurities in the silicon oxide film of Seo "in order to provide their art recognized advantages and produce an expected result."

Initially, Applicant submits that the Examiner's asserted motivation (i.e., combine references to obtain their art recognized advantages) to combine is nothing more than a generalization. If such a motivation were legally sufficient to establish a prima facie case of obviousness, then any number of references could be combined. Furthermore, Applicant notes that the Examiner has not specifically identified what the "art recognized advantages" and "expected result" of this combination would be and where teachings of these advantages and expected result can be found in the applied prior art.

Notwithstanding that the Examiner has not asserted a proper motivation to combine the applied prior art, the Examiner has failed to consider whether all the claimed limitations are taught or suggested by the applied prior art. For example, claim 4 recites that "the predetermined measurement value is a value expressing a physical quantity of the film to be processed" (emphasis added). Referring to Fig. 17 of Synder, the measurements made for the purpose of forward feedback are: (1) measure cap thickness, (2) measure final filler etch rate of as-densified filler, (3) measure trench depth, and (4) measure isotropic filler/resist etch rate of as-densified filler. However, none of these measurements are of a physical quantity of the film to be processed.

Claim 4 also recites that "the film to be processed is a silicon oxide film including impurities." Although the Examiner's statement of the rejection was silent as to "the film to be processed" that was allegedly disclosed by Synder, filler material 12 would appear to be the feature to which the Examiner was referring. The filler material 12 of Synder, however, is not disclosed as including impurities. Furthermore, the filler material 12 of Synder does not appear to be disclosed in the Description of the Preferred Embodiments as being formed from silicon oxide.

Therefore, the primary reference of Synder fails to teach or suggest that (a) the predetermined measurement value is a value expressing a physical quantity of the film to be processed and (b) that the film to be processed is a silicon oxide film including impurities.

Furthermore, although Ogawa and Seo teach that impurities can affect the etch rate of silicon oxide,

neither Ogawa nor Seo teaches or suggests measuring these impurities prior to etching, as recited in

claim 4. Instead, Ogawa teaches varying the concentration of impurities to effect the etching rate

(column 7, lines 61-66), and Seo uses materials having different etch rates to provide "tooth-like

prominences and depressions" (column 10, lines 48-54). Thus, even if the applied prior art were

combined, as advocated by the Examiner, the claimed invention would not result as the applied

prior art, either alone or in combination, fails to teach or suggest measuring the impurity

concentration of a silicon oxide layer to be etched and adjusting the etching of the silicon oxide

layer based upon the measured impurity concentration. Applicant, therefore, respectfully submits

that the imposed rejection of claim 4 under 35 U.S.C. § 103 for obviousness based upon Synder

in view of Ogawa or Seo is not viable and, hence, solicits withdrawal thereof.

**CLAIM 5 IS REJECTED UNDER 35 U.S.C. § 103 FOR OBVIOUSNESS BASED UPON SYNDER
IN VIEW OF DELFINO, U.S. PATENT NO. 4,443,493**

In the eighth enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the methodology of Synder in view of Delfino to arrive at the claimed invention. This rejection is respectfully traversed.

Applicant incorporates herein the arguments discussed above with regard to Synder.

Specifically, the primary reference of Synder fails to teach or suggest that (a) the predetermined measurement value is a value expressing a physical quantity of the film to be processed and (b) the film to be processed is a silicon oxide film including impurities. In the statement of the rejection, the Examiner asserted with regard to Delfino:

Delfino (col. 10, lines 40-42) teaches different refractive index results in different etch rates.

Applicant, however, respectfully disagrees with the Examiner's characterization of Delfino.

Delfino does not teach that a different refractive index results in different etch rates. Instead,

Delfino teaches that:

the densification process results in an increased density of the glass, an increase in the refractive index of the glass, and a decrease in the etch rate of the glass when etched with, for example, aqueous HF (emphasis added)

* (Thus, Delfino correlates densification with a change in refractive index and etch rate. However, this is not a teaching that refractive index of a material and the etch rate of the material are correlated.)

Furthermore, Delfino does not teach or suggest measuring the refractive index of the glass and modifying the etching rate of the glass as a result. Thus, even if the applied prior art were combined, as advocated by the Examiner, the claimed invention would not result as the applied prior art, either alone or in combination, fail to teach or suggest measuring the refractive index of a film to be etched and adjusting the etching of the film based upon the measured refractive index.

Applicant also incorporates herein the arguments previously presented with regard to the Examiner's motivation to combine Synder and Ogawa or Seo as also applying to the Examiner's motivation to combine Synder and Delfino. The Examiner's asserted motivation (i.e., combine references to obtain their art recognized advantages) to combine is nothing more than a

generalization. Furthermore, the Examiner has not specifically identified what the "art recognized advantages" and "expected result" of this combination would be and where teachings of these advantages and result can be found in the applied prior art. Applicant, therefore, respectfully submits that the imposed rejection of claim 5 under 35 U.S.C. § 103 for obviousness based upon Synder in view of Delfino is not viable and, hence, solicits withdrawal thereof.

CLAIM 7 AND 8 ARE REJECTED UNDER 35 U.S.C. § 103 FOR OBVIOUSNESS BASED UPON CAMPBELL OR YOKOYAMA

In the ninth enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to arrive at the claimed invention based upon the teachings of Campbell or Yokoyama. This rejection is respectfully traversed.

Claims 7 and 8 have been amended to depend upon independent claim 4. Examiner failed to reject claim 4 based upon either Campbell or Yokoyama. Therefore, as apparently recognized by the Examiner, Campbell or Yokoyama fails to teach or suggest the limitations recited in claim 4. As claim 7 and 8 depend upon claim 4, claims 7 and 8 are patentable over Campbell and Yokoyama at least on the basis of that dependency.

CLAIM 9 IS REJECTED UNDER 35 U.S.C. § 103 FOR OBVIOUSNESS BASED UPON SYNDER IN VIEW OF COUTEAU ET AL., U.S. PATENT NO. 6,352,867 (HEREINAFTER COUTEAU)

In the tenth enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the methodology of Synder in view of Couteau to arrive at the claimed invention. This rejection is respectfully traversed.

In the statement of the rejection, the Examiner asserted with regard to Couteau: Couteau (col. 4, line 58 to col. 5, line 26) teaches counting a time which has elapsed since replacement of a chemical to be used for the wet etching and wet etching processing requirement are determined on the basis of the elapsed time.

Applicant, however, respectfully disagrees with the Examiner's characterization of Couteau.

Although Couteau teaches that variations, as a result of use, in bath chemicals cause the etch rate to vary, Couteau does not teach varying the etch rate based upon elapsed time. Instead, Couteau advocates only that "these components both need to be replenished on a periodic basis" (column 5, lines 20-21). Thus, even if the applied prior art were combined, as proposed by the Examiner, the claimed invention would not result as the applied prior art, either alone or in combination, fails to teach or suggest measuring a time which has elapsed since replacement of a chemical used for wet etching and determining wet-etching processing based on the elapsed time. Applicant, therefore, respectfully submits that the imposed rejection of claim 9 under 35 U.S.C. § 103 for obviousness based upon Synder in view of Couteau is not viable and, hence, solicits withdrawal thereof.

CLAIM 10 IS REJECTED UNDER 35 U.S.C. § 103 FOR OBVIOUSNESS BASED UPON

COUTEAU

In the eleventh enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the methodology of Couteau to arrive at the claimed invention. This rejection is respectfully traversed.

Applicant incorporates herein the arguments discussed above with regard to Couteau. Specifically, Couteau does not teach varying the etch rate based upon elapsed time. Instead, Couteau advocates only that "these components both need to be replenished on a periodic basis" (column 5, lines 20-21). The Examiner has not established a motivation to modify Couteau to

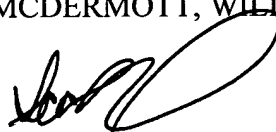
arrive at this missing limitation. Thus, Applicant respectfully submits that the imposed rejection of claim 10 under 35 U.S.C. § 103 for obviousness based upon Couteau is not viable and, hence, solicits withdrawal thereof.

Applicant has made every effort to present claims which distinguish over the prior art, and it is believed that all claims are in condition for allowance. However, Applicant invites the Examiner to call the undersigned if it is believed that a telephonic interview would expedite the prosecution of the application to an allowance. Accordingly, and in view of the foregoing remarks, Applicant hereby respectfully requests reconsideration and prompt allowance of the pending claims.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417, and please credit any excess fees to such deposit account.

Respectfully submitted,

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